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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/049,486	02/28/2002	Yelin Xu	FP01074US	4087

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JOSHUA D. ISENBERG  
204 CASTRO LANE  
FREMONT, CA 94539

EXAMINER
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OWENS, DOUGLAS W

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 07/30/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/049,486

Applicant(s)

XU ET AL.

Examiner

Douglas W Owens

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-18 is/are rejected.
- 7) ☒ Claim(s) 6 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) ✓
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: .

## DETAILED ACTION

### *Specification*

1. The disclosure is objected to because of the following informalities:

In line 15 of page 1, the phrase "...selenium rectifying plate in parallel connection" should be deleted or amended to make sense.

2. The use of the trademark kovar has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Appropriate correction is required.

### *Claim Objections*

3. Claims 1 – 18 are objected to because of the following informalities:

in line 2 of claim 1, "materials" should be replaced with "material"; ✓

in line 3 of claim 1, --are-- should be inserted between "electrodes" and "made"; ✓

in line 3 of claim 1, --and-- should be inserted between "metal" and "disposed"; ✓

in line 2 of claim 9, --a-- should be inserted between "to" and "glass"; ✓

in line 2 of claim 10, commas should be inserted so the claim reads, ✓

"...electrode, having the well-shape cavity, or each..."; ✓

in line 1 of claims 10 and 14, either "said" or "the" should be deleted; ✓

in line 2 of claim 13, "where" should be replaced with "wherein"; ✓

in line 3 of claim 13, --and-- should be inserted between "material" and "wherein"; ✓

in line 3 of claim 13, --the-- should be inserted between "wherein" and "average";

in lines 2 and 3 of claim 16, the limitation, "...there is no restriction on the overall shape formed by said different layers..." does<sup>it</sup> further limit the claim. Is the Applicant's intent to claim that the shape may be any shape? Appropriate correction is required.

4. Claim 6 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only. See MPEP § 608.01(n). **Accordingly, the claim has not been further treated on the merits.**

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 17 and 18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

7. Claim 17 requires that the semiconductor material between the metal plates be a liquid semiconductor. There is no disclosure of what materials the Applicant has contemplated using that ~~would~~ is a liquid and exhibits semiconductive properties. The Applicant has failed to disclose how such a liquid could be incorporated into the parallel plate diode. How would the liquid semiconductor layer remain between the metal

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plates? Is there some modification required to the plates that would enable the liquid to remain between the plates? One having ordinary skill in the art would be required to perform undue experimentation to reduce the claimed invention to practice.

8. Claim 18 requires that the semiconductor material comprise a metal alloy. The Applicant has not disclosed how a metal can also be a semiconductor.

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1 – 5 and 7 – 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

11. Claim 1 recites the limitation "...the two thin plate electrodes..." in line 3. There is insufficient antecedent basis for this limitation in the claim.

12. Claim 1 recites the limitation "...the semiconductor coat layer..." in line 8. There is insufficient antecedent basis for this limitation in the claim.

13. Claim 5 recites the limitation, "...convex portions and concave portions are staggered each other." The sentence doesn't make sense.

14. Claim 7 recites the limitation "...said substance..." in line 1. There is insufficient antecedent basis for this limitation in the claim.

15. The term "weak conductivity" in claim 7 is a relative term which renders the claim indefinite. The term "weak conductivity" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

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16. Claim 8 recites the limitation "...the insulated substrate..." in line 2. There is insufficient antecedent basis for this limitation in the claim.

17. Claim 10 recites the limitation "...of each diode..." in line 2. There is insufficient antecedent basis for this limitation in the claim. The term suggests more than one diode, but only one diode has been previously claimed.

18. Claim 10 recites the limitation "...the germanium electrode..." in lines 2 and 3. There is insufficient antecedent basis for this limitation in the claim.

19. Claim 10 recites the limitation "...the adjoining diode..." in line 3. There is insufficient antecedent basis for this limitation in the claim.

20. Claim 10 recites the limitation "...the well shape cavity..." in line 2. There is insufficient antecedent basis for this limitation in the claim.

21. Claims 11 and 12 include the trademark KOVAR. The scope of the claims is vague since the trademark or trade name cannot be used properly to identify any particular material or product. The use of the trademark in the claims also constitutes improper trademark use. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982).

22. Claim 12 recites the limitation "...the other diode..." in line 3. There is insufficient antecedent basis for this limitation in the claim.

23. Claim 13 recites the limitation, "...wherein [the] average diameter of the recesses on one side is equal to or smaller than..." It is not clear if the "one side" is the same as "the side" mentioned in claim 1, or if this is a reference to a different side. Nor is it clear how to determine which side "one side" refers to. Claim 1 only requires that one of the metal electrodes have recesses.

24. Claim 16 recites the limitation "...said layers of materials..." in lines 1 and 2.

There is insufficient antecedent basis for this limitation in the claim.

25. Claim 16 recites the limitation "...said different layers..." in line 3. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 103***

26. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

27. Claims 1 – 4, 7 – 9, 11 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over US patent No. 5,365,102 to Mehrotra et al.

Regarding claim 1, Mehrotra et al. teaches a parallel plate diode (Fig. 6F., for example), comprising:

metal electrodes (18, 20; Col. 8, lines 48 and 49);  
semiconductor material (12c, 12d) contacting the metal electrodes; and  
a plurality of recesses (14) in one of the metal electrodes, wherein the recesses are in a surface contacting the semiconductor material.

Mehrotra et al. does not explicitly teach that the concentration of carriers in the semiconductor material is 20% or less than that of the electrons in the metal. The device taught by Mehrotra et al. would have inherently had this feature since the material is identical to that of the claimed invention.

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Mehrotra et al. does not teach recesses that have a diameter of less than 4 microns. Mehrotra et al. is silent with respect to the diameter of the recesses. Therefore, one having ordinary skill in the art would have been required to arrive at the optimal diameter through routine experimentation. "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Regarding claim 2, Mehrotra et al. teaches a diode, wherein the recesses are well-shaped cavities.

Regarding claim 3, Mehrotra et al. teaches a diode, wherein the cross section of the well-shaped cavity is a square, circular or rectangle (Col. 5, lines 63 – 65).

Regarding claim 4, Mehrotra et al. teaches a diode, wherein the cross section of the well-shaped cavity is a groove shape (Col. 5, lines 63 – 65).

Regarding claim 7, Mehrotra et al. teaches a diode, wherein the substance between the metal electrodes is a substance of weak conductivity.

Regarding claim 8, Mehrotra et al. does not teach attaching a substrate to an insulated substrate. Insulated substrates are commonly used in the art, and are desirable because they can reduce parasitic capacitance, resulting in faster devices. It would have been obvious to one having ordinary skill in the art to attach the diode to an insulated substrate since it is desirable to produce fast devices.

Regarding claim 9, Mehrotra et al. does not teach a glass substrate. Glass substrates are a known insulative substrate that is commonly used in the art. It would



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have been obvious to one of ordinary skill to use a glass substrate since it is a known material that is well suited for the intended use. The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Regarding claim 11, Mehrotra et al. does not teach a diode, wherein the metal electrode is a KOVAR alloy. It would have been obvious to one having ordinary skill in the art to use a KOVAR alloy, since it is a known material that is well suited for the intended use, as discussed above.

Regarding claim 16, Mehrotra et al. teaches a diode wherein the layers of materials are parallel to each other, and includes shapes that are not restricted from the claimed invention.

### ***Conclusion***

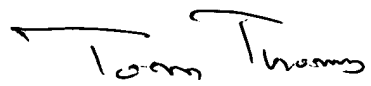
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas W Owens whose telephone number is 703-308-6167. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

DWO  
July 14, 2003

  
TOM THOMAS  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800